UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/571,602	10/26/2006	Paolo Massino Buscema	59836-140	9802

35743 7590 11/01/2007

KRAMER LEVIN NAFTALIS & FRANKEL LLP
INTELLECTUAL PROPERTY DEPARTMENT
1177 AVENUE OF THE AMERICAS
NEW YORK, NY 10036

EXAMINER	
BROWN JR, NATHAN H	

ART UNIT	PAPER NUMBER
2121	

NOTIFICATION DATE	DELIVERY MODE
11/01/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

klpatent@kramerlevin.com

mn

Office Action Summary	Application No.	Applicant(s)
	10/571,602	BUSCEMA, PAOLO MASSINO
	Examiner	Art Unit
	Nathan H. Brown, Jr.	2121

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 March 2006*.

2a)☐ This action is FINAL. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 March 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Examiner's Detailed Office Action

1. This Office is responsive to application 10/571,602, filed Mach 9, 2006.

2. Claims 13-26 have been examined.

Claim Rejections - 35 USC § 101

3. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

4. Claims 13-26 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter: abstraction and/or algorithm. Independent claim 13 recites:

> "A neural network, comprising: a plurality of nodes forming at least two layers, a first such layer being an input layer and a last such layer being an output layer, said input layer nodes and said output layer nodes being communicably connected…".

Claims 14-26 provide detailed mathematical limitations of claim 13. A neural network is considered to be a mathematical abstraction of the brain. Applicant states that "artificial neural networks belongs to the family of so called predictive algorithm which are able to learn from data" (*see* Specification, p. 1) and further, that such algorithms "provide technical apparati, such as computers which compute data in a way similar to the way as this data would have been treated by the human brain by providing in a more simple way

a structure which is conform to the known structure of the brain." (*see* Specification, p. 2). Thus, claim 13 clearly recites the 101 judicial exceptions of abstraction and/or algorithm, as claim 13 recites the parts of a neural network model and a series of transformations performed by the model. Further, claim 13 recites a final result of, "a transformation into output data of the input data received from the input layer", which is clearly not a practical application of the model as the input data does not come from a specific problem domain or represent anything specific or substantial in the real-world. Therefore, the result of transforming the input data does not represent anything specific and substantial in the real-world. Also, the claimed model is not embedded in, does not operate on, transform, or otherwise involve another class of statutory subject matter (*see* In Re Comiskey (Fed. Cir. 2006)). Claim 13 is therefore considered recite only the 101 judicial exceptions of abstraction and/or algorithm and to be non-statutory under 35 U.S.C. 101. Since claims 14-26 depend from claim 13 without curing the deficiency of claim 13, claims 13-26 are considered non-statutory under 35 U.S.C. 101.

5. Claims 13-26 are rejected under 35 U.S.C. 101 because the claimed invention violates the doctrine of preemption. Independent claim 13 recites:

> "A neural network, comprising: a plurality of nodes forming at least two layers, a first such layer being an input layer and a last such layer being an output layer, said input layer nodes and said output layer nodes being communicably connected...".

Claims 14-26 provide detailed mathematical limitations of claim 13. Neural networks are well known to be a class of models that utilize Kolomogorov's theorem concerning the realization of arbitrary multivariate functions and thus, are considered able to

approximate any continuous real-valued functions. Further, as Applicant states, "artificial neural networks belongs to the family of so called predictive algorithm which are able to learn from data" (*see* Specification, p. 1). Now, vectors used by neural networks can represent any conceivable thing or event by representing the attributes of any conceivable thing or event as elements of a vector. Since the result of neural network transformation of an input vector is another vector, the result of neural network processing can represent any conceivable thing or event. Clearly claim 13 violates the doctrine of preemption by applying the mathematics claimed to the generation of a final result that is "a transformation into output data of the input data received from the input layer" for data that does not come from a specific problem domain or represent anything specific and substantial in the real-world. Since claims 14-26 depend from claim 13 without curing the deficiency of claim 13, claims 13-26 are considered non-statutory under 35 U.S.C. 101.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 13-15 are rejected under 35 U.S.C. 102(b) as being anticipated by *Lin et al.* (*Lin*), "Neural Fuzzy Systems", 1996.

Regarding claim 13. *Lin* teaches a neural network, comprising:

a plurality of nodes forming at least two layers, a first such layer being an input layer and a last such layer being an output layer (*see* p. 237, Fig. 10.7, *Examiner interprets* x_j *(j=1,...,m) to be the input layer and* y_i *(i=1,...,n) to be the output layer.*), said input layer nodes and said output layer nodes being communicably connected (*see* p. 237, Fig. 10.7, *Examiner interprets* v_{qj} *to be connections providing communication between the nodes of the input layer and the nodes of the hidden layer and* w_{iq} *to be providing communication between the nodes of the hidden layer and the nodes of the output layer.*);

wherein data from a database is input to said input layer, and the results of processing said data are output from the output layer, the output layer nodes forming output channels (*see* p. 237, Fig. 10.7, *Examiner interprets* x_j *(j=1,...,m) to be the input data of a database and* y_i *(i=1,...,n) to be the results of processing said data output from the output layer, the output layer nodes forming output channels.*);

wherein each node of the output layer outputs a transformation into output data of the input data received from the input layer (*see* p. 237, Eq. (10.27), *Examiner interprets each* y_i *to be a node of the output layer carrying out a transformation of the input data received from the input layer into output data.*) said transformation comprising:

a first transformation step comprising at least a sub-step consisting in summing the input data received from the input nodes to the said output nodes by weighting the said input data (*see* p. 237, Eq. (10.27), *Examiner interprets*

$sum(w_{iq}a(sum(v_{qj}x_j), j=1,m), q=1,l)$ to be summing the input data received from the input nodes to the said output nodes by weighting the said input data.) and

a second transformation step which transforms nonlinearly the results obtained by the first transformation step the output data obtained by the said transformation carried out in an output node being the output data (*see* p. 237, Eq. (10.27), *Examiner interprets $a(sum(w_{iq}a(sum(v_{qj}x_j), j=1,m), q=1,l))$ where a is $a(net) = 1 / (1 + exp(-\lambda net))$ (see p. 240, Eq. (10.45)) to be a second transformation step which transforms nonlinearly the results obtained by the first transformation step the output data obtained by the said transformation carried out in an output node being the output data.*),

wherein in each output node the first transformation step comprises two sub-steps:

a first sub-step being a nonlinear transformation function of the input data received by the output nodes from the input nodes (*see* p. 237, Eq. (10.25), *Examiner interprets $a(sum(v_{qj}x_j), j=1,m)$ where a is $a(net) = 1 / (1 + exp(-\lambda net))$ (see p. 240, Eq. (10.45)) to be a nonlinear transformation function of the input data received by the output nodes from the input nodes.*),

and the second sub-step being the summing step of the said nonlinearly transformed input data in the said first sub-step (*see* p. 237, Eq. (10.27), *Examiner interprets $a(sum(w_{iq}a(sum(v_{qj}x_j), j=1,m), q=1,l))$ where a is $a(net) = 1 / (1 + exp(-\lambda net))$ (see p. 240, Eq. (10.45)) to be the*

second sub-step being the summing step of the said nonlinearly transformed input data in the said first sub-step.).

Regarding claim 14. *Lin* teaches an artificial neural network according to claim 13, wherein the input layer has a predetermined number of input nodes (*see* p. 241, Fig. 10.8, *Examiner interprets y_0, y_1, and y_2 to be a predetermined number of input nodes.*) and the output layer has a predetermined number of output nodes (*see* p. 241, Fig. 10.8, *Examiner interprets y_9 to be a predetermined number of output nodes.*);

wherein between the input and the output layer there is provided at least one further hidden layer of nodes (*see* p. 241, Fig. 10.8, *Examiner interprets y_3, y_4, y_5 and y_6, y_7, y_8 to be at least one further layer of nodes, so called hidden layer, or more than one hidden layers.*), the nodes of said hidden layer being connected by weighted connection to the input nodes of the input layer (*see* p. 241, Fig. 10.8, *Examiner interprets w_{30}, w_{40}, w_{31}, w_{41}, w_{32}, and w_{42} to be weighted connection to between the nodes of the hidden layers and the input nodes of the input layer.*) and to the nodes of a further hidden layer when more than one hidden layer is provided (*see* p. 241, Fig. 10.8, *Examiner interprets w_{63}, w_{73}, w_{64}, w_{74}, w_{65}, and w_{75} to be weighted connection to the nodes of a further hidden layer when more than one hidden layer is provided.*);

wherein each node of the at least one hidden layer or of the more than one hidden layers and the nodes of the output layer carry out a transformation of the input data received from the input layer, or from a preceding hidden layer, into output data (*see* p. 237, Eq.

(10.27), *Examiner interprets* $a(sum(w_{iq}a(sum(v_{qj}x_j), j=1,m), q=1,l))$ *where a is* $a(net) = 1 / (1 + exp(-\lambda net))$ *(see p. 240, Eq. (10.45)) to be nodes of the output layer carrying out a transformation of the input data received from the input layer or from a preceding hidden layer into output data.*), said transformation comprising:

a first transformation step consisting in two subsequent sub-steps:

a first sub-step consisting in a nonlinear transformation function of the input data received by the output nodes, or by the nodes of a hidden layer, from the input nodes of the input layer or by the nodes of the preceding hidden layer (*see* p. 237, Eq. (10.25), *Examiner interprets* $a(sum(v_{qj}x_j), j=1,m)$ *where a is* $a(net) = 1 / (1 + exp(-\lambda net))$ *(see p. 240, Eq. (10.45)) to be a nonlinear transformation function of the input data received by the output nodes from the input nodes.*),

and a second sub-step consisting in summing the said input data being nonlinearly transformed in the first sub-step by further weighting the said nonlinearly transformed input data (*see* p. 237, Eq. (10.27), *Examiner interprets* $sum(w_{iq}a(sum(v_{qj}x_j), j=1,m), q=1,l)$ *where a is* $a(net) = 1 / (1 + exp(-\lambda net))$ *(see p. 240, Eq. (10.45)) to be summing the said input data being nonlinearly transformed in the first sub-step by further weighting the said nonlinearly transformed input data.*), and

a further second transformation step being carried out which transforms nonlinearly the results obtained by the first transformation step (*see* p. 237, Eq. (10.27), *Examiner interprets* $a(sum(w_{iq}a(sum(v_{qj}x_j), j=1,m), q=1,l))$ *where a is* $a(net) = 1 / (1 +$

exp(-λnet)) (see p. 240, Eq. (10.45)) to transforms nonlinearly the results obtained by the first transformation step.),

wherein the output data obtained by the said transformation carried out in the said nodes being the output data if the nodes are the output nodes of the output layer or the input data furnished from the nodes of a hidden layer to the nodes of a following hidden layer or to the output nodes of the output layer (*see* p. 237, Eq. (10.27), *Examiner interprets* $a(sum(w_{iq}a(sum(v_{qj}x_j), j=1,m), q=1,l))$ *where a is* $a(net) = 1 / (1 + exp(-\lambda net))$ *(see p. 240, Eq. (10.45)) to be nodes of the output layer carrying out a transformation of the input data received from the input layer or from a preceding hidden layer into output data which transformation comprises a first transformation step consisting in two subsequent sub-steps, a first sub-step consisting in a non linear transformation function of the input data received by the output nodes or by the nodes of a hidden layer from the input nodes of the input layer or by the nodes of the preceding hidden layer and the second sub-step consisting in summing the said input data being non linearly transformed in the said first sub-step by further weighting the said non linearly transformed input data and a further second transformation step being carried out which transforms non linearly the results obtained by the first transformation step, the output data obtained by the said transformation carried out in the said nodes being the output data if the nodes are the output nodes of the output layer or the input data furnished from the nodes of a hidden layer to the nodes of a following hidden layer or to the output nodes of the output layer.*).

Regarding claim 15. *Lin* teaches an artificial neural network according to claim 14, wherein the input data of the nodes of the input layer consist in the input data of the database (*see* p. 237, Fig. 10.7, *Examiner interprets x_j (j=1,...,m) to be the input data of a database.*), while the output data of the nodes of the input layer are furnished to the nodes of the output layer or to the nodes of the first hidden layer or to the at least one hidden layer as input data of the nodes of these layers (*see* p. 237, Fig. 10.7) and the output data of the output layer consist in the processing result of the artificial neural network (*see* p. 237, Fig. 10.7, *Examiner interprets y_i (i=1,...,n) to be the output data of the output layer consisting in the processing result of the artificial neural network.*).

Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nathan H. Brown, Jr. whose telephone number is 571-272- 8632. The examiner can normally be reached on M-F 0830-1700. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Vincent can be reached on 571-272-3080. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

10/24/07
David Vincent
Supervisory Patent Examiner
Tech Center 2100

Nathan H. Brown, Jr.
October 26, 2007